Access DB# 91534

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Lynette T. Umez-Eronini Examiner #: 74987 Date: 4/14/03
Art Unit: 1765 Phone Number 306-9074 Serial Number: ~~09~~/ 10/075607
Mail Box and Bldg/Room Location: CP3/10E12 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

****

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Etching Process for Organic Anti-reflective coating

Inventors (please provide full names): Jeffrey Hung and Brian Lee

Earliest Priority Filing Date: December 31, 1997 (early filing date cut out a lot of art)

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

search claims. 14, 18, 21, 28, 29, and 30

(etching or etchant)

CH_3F; Ar or argon; HCl or hydrochloric; and BCl_3 or trichloroboron or boron trichloride.

Note: inert = noble = He, Ar, Ne, Xe, Kr

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STAFF USE ONLY	Type of Search	Vendors and cost where applicable
Searcher: EJ	NA Sequence (#)	STN $219.85
Searcher Phone #:	AA Sequence (#)	Dialog
Searcher Location:	Structure (#)	Questel/Orbit
Date Searcher Picked Up:	Bibliographic ✓	Dr.Link
Date Completed: 4-16-03	Litigation	Lexis/Nexis
Searcher Prep & Review Time: 5	Fulltext	Sequence Systems
~~Clerical Prep Time:~~	Patent Family	WWW/Internet
Online Time: 75	Other	Other (specify)

PTO-1590 (8-01)

14. (Twice Amended) An oxygen-free plasma etching gas formulation for removing an organic ARC on a metallic layer comprising CHF_3, argon and HCl or BCl_3, the gas formulation being free of SF_6.

18. (Twice Amended) An oxygen-free plasma etching gas formulation for removing an organic ARC on a metallic layer comprising CHF_3, argon and chlorine, the gas formulation being free of SF_6, and a ratio of flow rates of CHF_3:argon:chlorine in the formulation is 5 to 80 sccm:5 to 80 sccm:5 to 60 sccm.

21. (Amended) An oxygen-free plasma etching gas formulation for removing an organic ARC on a metallic layer comprising more than one fluorine-containing compound, an optional inert carrier gas, and chlorine, the gas formulation being free of SF_6.

28. (New) The gas formulation of Claim 14, which comprises HCl.

29. (New) The gas formulation of Claim 14, which comprises BCl_3.

30. (New) The gas formulation of Claim 21, which comprises an inert carrier gas.

```
=> file reg
FILE 'REGISTRY' ENTERED AT 15:55:49 ON 16 APR 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
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=> display history full l1-


     FILE 'REGISTRY' ENTERED AT 14:21:24 ON 16 APR 2003
                  E CHF3/MF
L1                8 SEA CHF3/MF
                  E HYDROGEN CHLORIDE/CN
L2                1 SEA "HYDROGEN CHLORIDE"/CN
                  E BORON TRICHLORIDE/CN
L3                1 SEA "BORON TRICHLORIDE"/CN

     FILE 'LCA' ENTERED AT 14:24:09 ON 16 APR 2003
L4              441 SEA (ETCH? OR CHASE# OR CHASING# OR ENCHAS? OR ENGRAV?
                    OR EMBOSS? OR INCIS? OR IMPRINT? OR IMPRESS? OR ENCAUSTIC
                    ?)/BI,AB

     FILE 'HCA' ENTERED AT 14:28:06 ON 16 APR 2003
L5           206570 SEA ETCH? OR MICROETCH? OR CHASE# OR CHASING# OR ENCHAS?
                    OR ENGRAV? OR MICROENGRAV? OR EMBOSS? OR MICROEMBOSS? OR
                    INCISE# OR INCISING# OR IMPRINT? OR IMPRESS? OR ENCAUSTIC
                    ?
L6                  QUE PLASMA#
L7             7249 SEA L1 OR TRIFLUOROMETHANE# OR FLUOROFORM# OR CHF3 OR
                    HCF3 OR F3HC OR F3CH
L8           141360 SEA (INERT# OR NOBLE# OR HELIUM# OR HE OR NEON# OR NE OR
                    ARGON# OR AR OR KRYPTON# OR KR)(2A)(ATMOS? OR ATM# OR
                    GAS## OR GASEOUS? OR GASIF?)
L9            21613 SEA (INERT# OR NOBLE# OR HELIUM# OR HE OR NEON# OR NE OR
                    ARGON# OR AR OR KRYPTON# OR KR)(2A)(TREAT? OR PRETREAT?
                    OR APPLY? OR APPLICATION? OR APPLIED OR INJECT? OR
                    INTRODUC? OR PORT OR PORTS OR PORTAL? OR SYRING? OR
                    NEEDL? OR JET OR JETS OR NOZZL? OR BLANKET? OR STREAM?)
L10           21772 SEA (INERT# OR NOBLE# OR HELIUM# OR HE OR NEON# OR NE OR
                    ARGON# OR AR OR KRYPTON# OR KR)(2A)(PROCESS? OR CONDITION
                    ? OR PRECONDITION?)
L11          581223 SEA L2 OR (HYDROCHLORIC# OR MURIATIC#)(A)ACID# OR
                    HYDROGEN#(A)CHLORIDE# OR HCL
L12            8696 SEA L3 OR BORON##(A)(CHLORIDE# OR TRICHLORIDE#) OR CL3B
                    OR BCL3
L13           27078 SEA L5 AND L6
L14            1499 SEA L13 AND L7
L15             185 SEA L14 AND (L11 OR L12)
L16              42 SEA L15 AND (L8 OR L9 OR L10)
L17             224 SEA (FREE# OR ABSENT? OR ABSENC? OR LACK? OR NONE# OR NO
                    OR DEVOID? OR UNAVAIL?)(2A)(SF6 OR (SULFER# OR SULFUR#
```

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                OR SULPHER# OR SULPHUR#)(2A)HEXAFLUORIDE#)

     FILE 'REGISTRY' ENTERED AT 14:57:35 ON 16 APR 2003
                E SULFUR HEXAFLUORIDE/CN
L18             1 SEA "SULFUR HEXAFLUORIDE"/CN

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L19         16481 SEA L18 OR (SULFER# OR SULPHER# OR SULFUR# OR SULPHUR#)(A
                )HEXAFLUORIDE# OR SF6 OR F6S
L20             0 SEA L16 AND L17
L21            26 SEA L16 NOT L19

     FILE 'REGISTRY' ENTERED AT 15:00:21 ON 16 APR 2003
                E CHLORINE/CN
L22             1 SEA CHLORINE/CN

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L23        147900 SEA L22 OR CHLORINE# OR CL2 OR CL(2A)(GAS## OR GASEOUS?
                OR GASIF? OR ATM# OR ATMOS?)
L24           335 SEA L5 AND L6 AND L7 AND L23
L25            70 SEA L24 AND (L8 OR L9 OR L10)
L26             0 SEA L25 AND L17
L27            38 SEA L25 NOT L19
L28            15 SEA L17 AND L5 AND L6
L29             0 SEA L28 AND L23
L30             2 SEA L28 AND L7
L31               QUE ?FLUORO? OR ?FLUORI? OR HF OR F2 OR F
L32            15 SEA L28 AND L31

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L33             1 SEA OXYGEN/CN

     FILE 'HCA' ENTERED AT 15:15:16 ON 16 APR 2003
L34        500188 SEA L33 OR OXYGENA? OR O2 OR (OXYGEN# OR O)(2A)(GAS## OR
                GASIF? OR GASEOUS? OR ATM# OR ATMOS)
L35         56210 SEA (FREE# OR ABSENT? OR ABSENC? OR LACK? OR NONE# OR NO
                OR DEVOID? OR UNAVAIL?)(2A)(OXYGEN# OR O2 OR O)
L36         35424 SEA (FREE# OR ABSENT? OR ABSENC? OR LACK? OR NONE# OR
                DEVOID? OR UNAVAIL?)(2A)(OXYGEN# OR O2 OR O)
L37             0 SEA L21 AND L35
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L39            11 SEA L21 NOT L34
L40             0 SEA L27 AND L35
L41             0 SEA L27 AND L36
L42            18 SEA L27 NOT L34
L43             5 SEA L32 AND L35
L44             4 SEA L32 AND L36
L45             8 SEA L32 NOT L34
L46            14 SEA L30 OR L43 OR L44 OR L45
L47             0 SEA L46 NOT L19
L48            60 SEA L5 AND L6 AND L36
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L49            4 SEA L48 AND L17
L50           45 SEA L48 NOT L19
L51            5 SEA L50 AND L23
L52            2 SEA L51 AND L31
L53        21402 SEA (L5 AND L6) NOT L34
L54        20325 SEA L53 NOT L19
L55         1940 SEA L54 AND L23
L56          323 SEA L55 AND (L8 OR L9 OR L10)
L57           18 SEA L56 AND L7
L58           76 SEA L56 AND L31
L59           76 SEA L58 NOT L34
L60        37344 SEA (ETCH? OR MICROETCH?)/TI
L61           51 SEA L59 AND L60
L62            0 SEA L57 NOT (L39 OR L42)
L63           39 SEA L61 NOT (L39 OR L42)
L64           17 SEA L63 AND 1907-1997/PY
L65           17 SEA L64 NOT L52
L66            4 SEA L39 AND 1907-1997/PY
L67            6 SEA L42 AND 1907-1997/PY
L68         1499 SEA L5 AND L6 AND L7
L69          363 SEA L68 AND (L11 OR L12 OR L23)
L70          220 SEA L69 NOT L19
L71          129 SEA L70 NOT L34
L72            0 SEA L70 AND L36
L73           18 SEA L71 AND (L8 OR L9 OR L10)
L74            6 SEA L73 AND 1907-1997/PY
L75            0 SEA L74 NOT (L66 OR L67 OR L52 OR L65)

     FILE 'REGISTRY' ENTERED AT 15:55:49 ON 16 APR 2003


=> file hca
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trying to focus on claim 14

```
=> d 166 1-4 ibib abs hitstr hitind

L66  ANSWER 1 OF 4  HCA  COPYRIGHT 2003 ACS
ACCESSION NUMBER:        127:155062  HCA
TITLE:                   Minimizing metal etch rate pattern
                         sensitivity in a high density plasma
                         etcher
AUTHOR(S):               Gabriel, Calvin T.; Zheng, Jie; Abraham, Susan
                         C.
CORPORATE SOURCE:        VLSI Technol., San Jose, CA, 95131, USA
SOURCE:                  Journal of Vacuum Science & Technology, A:
```

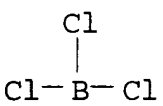
Vacuum, Surfaces, and Films (**1997**),
15(3, Pt. 1), 697-701
CODEN: JVTAD6; ISSN: 0734-2101
PUBLISHER: American Institute of Physics
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The variation of metal **etch** rate with spacing between metal lines was measured from SEM micrographs of TiN/Al-0.5%Cu/TiN wafers **etched** in a high d. inductively coupled **plasma** metal **etcher**. The metal **etch** rate was found to depend on the spacing between metal lines, with **etch** rate significantly decreasing in very narrow spaces for a conventional Cl2/**BCl3** chem. The effect of several process parameters on this **etch** rate dependence was studied. It was found that the dependence could be reduced significantly, and the traditional roll off of **etch** rate as spacing decreases could be eliminated, by the choice of process gases. Addn. of 15% **CHF3** to a **BCl3**/Cl2 mixt. resulted in a 50% redn. of the effect, and addn. of both **CHF3** and **Ar** under certain **process** conditions resulted in almost complete redn. or even inversion of the effect. A mechanism is propsed for this improvement: sidewall passavants like **CHF3** reduce the sticking coeff. of chlorine on aluminum, boosting reactant flux to the bottom of high aspect ratio openings.

IT **10294-34-5, Boron chloride**
(**etching** atm.; minimizing metal **etch** rate pattern sensitivity in high d. **plasma etcher** in relation to)

RN 10294-34-5 HCA

CN Borane, trichloro- (9CI) (CA INDEX NAME)



CC 76-3 (Electric Phenomena)
Section cross-reference(s): 56

ST wafer **etching plasma** pattern sensitivity; metal **etching** pattern sensitivity **plasma**; methyl fluoride metal **etching** pattern sensitivity; **boron chloride** metal **etching** pattern sensitivity; chlorine metal **etching** pattern sensitivity

IT **Etching**
Plasma
(minimizing metal **etch** rate pattern sensitivity in high d. **plasma etcher**)

IT 593-53-3, Fluoromethane
(additive; minimizing metal **etch** rate pattern sensitivity in high d. **plasma etcher** in relation to)

IT 7782-50-5, Chlorine, uses **10294-34-5, Boron chloride**
(**etching** atm.; minimizing metal **etch** rate pattern sensitivity in high d. **plasma etcher** in relation to)
IT 11100-89-3 25583-20-4, Titanium nitride, TiN
(variation of metal **etch** rate with spacing between metal lines as measured from SEM micrographs of TiN/Al-0.5%Cu/TiN wafers **etched** in high d. inductively coupled **plasma**)

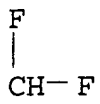
L66 ANSWER 2 OF 4 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 124:162357 HCA
TITLE: **Plasma etching** of vias in a dielectric layer with removal of residues
INVENTOR(S): Shan, Hongching; Wu, Robert
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: Eur. Pat. Appl., 7 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 691678	A2	19960110	EP 1995-110240	19950630 <--
EP 691678	A3	19971001		
R: AT, BE, CH, DE, ES, FR, GB, GR, IE, IT, LI, NL, SE				
US 5514247	A	19960507	US 1994-272356	19940708 <--
JP 08172077	A2	19960702	JP 1995-173689	19950710 <--

PRIORITY APPLN. INFO.: US 1994-272356 19940708

AB Disclosed is a process for **plasma etching** a mask-patterned dielec. film to form vias on a semiconductor wafer, so that the resulting **etched** structure is devoid of residues on the walls of the structure. A via is an opening through a dielec. material through which a point of contact of underlying metal with a metal film deposited over the dielec. is made. The underlying metal, when exposed to **plasma**, has a tendency to sputter onto the vertical wall portions of the contact via structures. The metal-contg. sputtered material forms a residue that essentially cannot be removed in the subsequent photoresist stripping process typically used in semiconductor manufg. The **plasma etch** process in accordance with the invention enables removal of the sputtered metal by using with the basic dielec. **etch** gases a gas that reacts with the metal to form volatile compds. which are readily evacuable.
IT **75-46-7, Fluoroform 7647-01-0, Hydrogen chloride**, processes **10294-34-5, Boron chloride (BCl3)**
(**plasma etching** of vias in a dielec. layer in presence of)

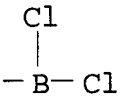
RN 75-46-7 HCA
CN Methane, trifluoro- (8CI, 9CI) (CA INDEX NAME)



RN 7647-01-0 HCA
CN Hydrochloric acid (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

HCl

RN 10294-34-5 HCA
CN Borane, trichloro- (9CI) (CA INDEX NAME)



IC ICM H01L021-311
ICS H01L021-768
CC 76-2 (Electric Phenomena)
ST **plasma etching** via dielec layer; residue removal via **etching** dielec layer
IT Electric insulators and Dielectrics
(**plasma etching** of vias in a dielec. layer with removal of residues)
IT Sputtering
(**etching**, of vias in a dielec. layer with removal of residues)
IT Electric conductors
(interconnections, **plasma etching** of vias in a dielec. layer with removal of residues)
IT **Etching**
(sputter, of vias in a dielec. layer with removal of residues)
IT **75-46-7**, **Fluoroform** 75-73-0, Tetrafluoromethane 76-16-4, Hexafluoroethane 7440-37-1, **Argon**, **processes** **7647-01-0**, **Hydrogen chloride**, processes 7726-95-6, Bromine, processes 7727-37-9, Nitrogen, processes 7782-50-5, Chlorine, processes 10035-10-6, Hydrogen bromide, processes **10294-34-5**, **Boron chloride (BCl3)**
(**plasma etching** of vias in a dielec. layer in presence of)
IT 7429-90-5, Aluminum, miscellaneous
(**plasma etching** of vias in dielec. layers on)

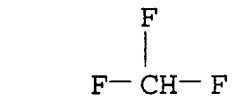
L66 ANSWER 3 OF 4 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 122:21334 HCA

TITLE: Charge damage caused by electron shading effect
AUTHOR(S): Hashimoto, Koichi
CORPORATE SOURCE: LSI Wafer Process Division, Kawasaki, 211, Japan
SOURCE: Japanese Journal of Applied Physics, Part 1: Regular Papers, Short Notes & Review Papers (**1994**), 33(10), 6013-18
CODEN: JAPNDE; ISSN: 0021-4922
DOCUMENT TYPE: Journal
LANGUAGE: English

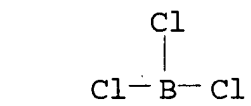
AB An antenna covered with photoresist patterns having high-aspect-ratio openings caused charge damage to the gate oxide in various processing **plasmas**. This damage increased with the pattern's aspect ratio, and occurred even when the test wafer was cut into chips .apprx.5 mm square and mounted on a wafer with insulation. These results prove the electron shading mod14986-21-1el: the photoresist patterns shade the antenna from electrons of oblique incidence, resulting in local charging occurring without a wafer-scale voltage difference, which is essential for conventional charging. The damaging current from this mechanism increased by a factor of more than ten with a decrease in the gate oxide thickness only from 8 nm to 6 nm, implying that the degree of shading depends on the gate charging voltage. An improved model is proposed top accommodate this strong dependence.

IT **75-46-7, Fluoroform 10294-34-5, Boron trichloride**
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)

RN 75-46-7 HCA
CN Methane, trifluoro- (8CI, 9CI) (CA INDEX NAME)



RN 10294-34-5 HCA
CN Borane, trichloro- (9CI) (CA INDEX NAME)



CC 76-3 (Electric Phenomena)

IT Electric capacitors
Ionization in solids
Plasma
Simulation and Modeling, physicochemical
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)

IT Electric breakdown
(of SiO2 gates as function of thickness after **plasma**

processing)
IT Sputtering
(**etching**, charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT **Etching**
(sputter, charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT 7631-86-9, Silica, properties
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT 7440-37-1, **Argon**, **processes**
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT **75-46-7**, **Fluoroform** 75-73-0, Tetrafluoromethane 7782-50-5, Chlorine, reactions 10035-10-6, Hydrogen bromide, reactions **10294-34-5**, **Boron trichloride**
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)

L66 ANSWER 4 OF 4 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 115:237947 HCA
TITLE: **Etching** properties of aluminum oxide films prepared by **plasma** enhanced metal organic chemical vapor deposition
AUTHOR(S): Kang, C. J.; Kim, Y. C.; Park, C. O.; Lee, W. J.; Chun, John S.
CORPORATE SOURCE: Dep. Mater. Sci. Eng., Korea Adv. Inst. Sci. Technol., Seoul, 131-00, S. Korea
SOURCE: Materials Science Monographs (**1991**), 67(High Perform. Ceram. Films Coat.), 391-8
CODEN: MSMODP; ISSN: 0166-6010
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Al2O3 films were deposited on Si substrates at low temps. (150.degree.-300.degree.) by **plasma**-enhanced chem.-vapor deposition using trimethylaluminum, N2O, and **He gases**. The films deposited at 150.degree. have an amorphous structure. Those deposited >250.degree. have an extremely fine .gamma.-Al2O3 polycryst. structure. H is the only impurity detected in the Al2O3 film and its concn. increases as the deposition temp. decreases. The dry and wet **etch** behaviors of Al2O3 were studied in F- and Cl-based **plasmas** as well as in a dil. HF soln. The dry and wet **etch** rate of the film decreases as the deposition temp. increases. The Al2O3 films are hardly **etched** in a **CHF3**/C2F6 **plasma**, resulting in the **etch** rate ratio of 1:30 with respect to the low-temp. SiO2. On the other hand, the **etch** rates in a Cl2/**BCl3**/He **plasma** and in a dil. HF soln. are much higher than those in the F-based **plasma**.
CC 57-2 (Ceramics)
ST alumina organometallic **plasma** CVD **etching**

property
IT **Etching**
(of alumina films, prepn. by **plasma**-enhanced organometallic CVD in relation to)
IT Coating process
(chem.-vapor, organometallic, **plasma**-enhanced, with alumina, **etching** properties in relation to)
IT 1344-28-1P, Alumina, uses and miscellaneous
(coatings, **etching** properties of, prepn. by **plasma**-enhanced organometallic CVD in relation to)

claim 18

=> d 167 1-6 ibib abs hitstr hitind

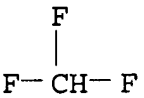
L67 ANSWER 1 OF 6 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 127:213710 HCA
TITLE: Method for **plasma etching** of semiconductor wafers and an integrated circuit manufactured using the method
INVENTOR(S): Abraham, Susan C.
PATENT ASSIGNEE(S): Lam Research Corporation, USA
SOURCE: PCT Int. Appl., 33 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9730472	A1	19970821	WO 1997-US2655	19970214 <--
W: JP, KR				
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
US 6004884	A	19991221	US 1996-602251	19960215
EP 880799	A1	19981202	EP 1997-907719	19970214
EP 880799	B1	20030102		
R: DE, FR, GB, IT, NL				
JP 2000504884	T2	20000418	JP 1997-529598	19970214

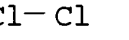
PRIORITY APPLN. INFO.: US 1996-602251 A 19960215
WO 1997-US2655 W 19970214

AB A method for **etching** a TiN layer of a wafer stack in a **plasma** processing chamber is described. The method includes the step of **etching** at least partially through the TiN layer using a 1st chem., which preferably includes a TiN **etchant**, a **noble gas**, and a polymer-forming chem. In 1 embodiment, the TiN **etchant** is **Cl2**, the **noble gas** is **Ar**, and the polymer-forming chem. is **CHF3**.
IT **75-46-7, Fluoroform 7782-50-5, Chlorine**, processes
(**plasma etching** of semiconductor wafers in

integrated circuit manuf. using gas mixts. contg.)
RN 75-46-7 HCA
CN Methane, trifluoro- (8CI, 9CI) (CA INDEX NAME)



RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-302
ICS H01L021-321; C04B041-53
CC 76-3 (Electric Phenomena)
ST **plasma etching** semiconductor wafer; integrated circuit manuf **plasma etching**; titanium nitride **etching** integrated circuit manuf
IT Semiconductor materials
(**plasma etching** of semiconductor wafers in integrated circuit manuf.)
IT **Noble gases, processes**
(**plasma etching** of semiconductor wafers in integrated circuit manuf. using gas mixts. contg.)
IT Integrated circuits
(**plasma etching** of semiconductor wafers in manuf. of)
IT **Etching**
(**plasma**; of semiconductor wafers in manuf. of integrated circuits)
IT 7440-32-6, Titanium, processes 25583-20-4, Titanium nitride (TiN)
(**plasma etching** of layers of)
IT **75-46-7, Fluoroform** 7440-37-1, **Argon**, **processes 7782-50-5, Chlorine**, processes
(**plasma etching** of semiconductor wafers in integrated circuit manuf. using gas mixts. contg.)

L67 ANSWER 2 OF 6 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 127:155062 HCA
TITLE: Minimizing metal **etch** rate pattern sensitivity in a high density **plasma etcher**
AUTHOR(S): Gabriel, Calvin T.; Zheng, Jie; Abraham, Susan C.
CORPORATE SOURCE: VLSI Technol., San Jose, CA, 95131, USA
SOURCE: Journal of Vacuum Science & Technology, A: Vacuum, Surfaces, and Films (**1997**), 15(3, Pt. 1), 697-701
CODEN: JVTAD6; ISSN: 0734-2101

PUBLISHER: American Institute of Physics
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The variation of metal **etch** rate with spacing between metal lines was measured from SEM micrographs of TiN/Al-0.5%Cu/TiN wafers **etched** in a high d. inductively coupled **plasma** metal **etcher**. The metal **etch** rate was found to depend on the spacing between metal lines, with **etch** rate significantly decreasing in very narrow spaces for a conventional **Cl2**/BCl3 chem. The effect of several process parameters on this **etch** rate dependence was studied. It was found that the dependence could be reduced significantly, and the traditional roll off of **etch** rate as spacing decreases could be eliminated, by the choice of process gases. Addn. of 15% **CHF3** to a BCl3/**Cl2** mixt. resulted in a 50% redn. of the effect, and addn. of both **CHF3** and **Ar** under certain **process** conditions resulted in almost complete redn. or even inversion of the effect. A mechanism is propsed for this improvement: sidewall passavants like **CHF3** reduce the sticking coeff. of **chlorine** on aluminum, boosting reactant flux to the bottom of high aspect ratio openings.

IT **7782-50-5**, **Chlorine**, uses
(**etching** atm.; minimizing metal **etch** rate pattern sensitivity in high d. **plasma etcher** in relation to)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 76-3 (Electric Phenomena)
Section cross-reference(s): 56

ST wafer **etching plasma** pattern sensitivity; metal **etching** pattern sensitivity **plasma**; methyl fluoride metal **etching** pattern sensitivity; boron chloride metal **etching** pattern sensitivity; **chlorine** metal **etching** pattern sensitivity

IT **Etching**
Plasma
(minimizing metal **etch** rate pattern sensitivity in high d. **plasma etcher**)

IT 593-53-3, Fluoromethane
(additive; minimizing metal **etch** rate pattern sensitivity in high d. **plasma etcher** in relation to)

IT **7782-50-5**, **Chlorine**, uses 10294-34-5, Boron chloride
(**etching** atm.; minimizing metal **etch** rate pattern sensitivity in high d. **plasma etcher** in relation to)

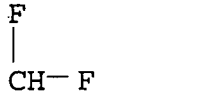
IT 11100-89-3 25583-20-4, Titanium nitride, TiN
(variation of metal **etch** rate with spacing between metal lines as measured from SEM micrographs of TiN/Al-0.5%Cu/TiN wafers **etched** in high d. inductively coupled **plasma**)

L67 ANSWER 3 OF 6 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 125:344661 HCA
TITLE: New ultrahigh-frequency **plasma** discharge for large-scale **etching** processes
AUTHOR(S): Samukawa, Seiji; Nakano, Toshiki
CORPORATE SOURCE: Microelectronics Research Laboratories, Japan
SOURCE: NEC Research & Development (**1996**), 37(3), 317-324
CODEN: NECRAU; ISSN: 0547-051X
PUBLISHER: NEC Culture Center, Ltd.
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Electron, ion and neutral temps. are measured in an ultrahigh-frequency (UHF) **plasma** by Langmuir probe and Doppler-shifted laser-induced fluorescence. The electron, ion and neutral temps. are 1.5-2.0 eV (Ar **plasma**), 0.066 eV for Ar+ and 0.036 eV for Ne, resp., and are lower than those reported for electron cyclotron resonance and helicon wave **plasmas**. The low temps. cause lower dissocns. of **CHF3** gas even in the **plasma** prodn. region of the UHF **plasma** source. The **plasma** is expected to improve significantly the selectivity of SiO2 to underlying Si. Addnl., the **plasma** can be used to accomplish notch-free poly-Si **etching** profile and micro-loading-free Si trench **etching** with a high **etching** rate and high anisotropy with a narrow space pattern of <0.3 .mu.m. Probably the charge accumulation with the narrow space pattern should be eliminated because of the low electron temp. in the UHF **plasma**.

IT **75-46-7P 7782-50-5P, Chlorine,** preparation
(new ultrahigh-frequency **plasma** discharge for large-scale **etching** processes)

RN 75-46-7 HCA
CN Methane, trifluoro- (8CI, 9CI) (CA INDEX NAME)



RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 76-11 (Electric Phenomena)
ST ultra high frequency **plasma** discharge **etching**; silicon silica argon neon **chlorine** **trifluoromethane**
IT **Etching**
Plasma
(new ultrahigh-frequency **plasma** discharge for large-scale **etching** processes)
IT **Helium**-group **gases**
(new ultrahigh-frequency **plasma** discharge for large-scale **etching** processes)
IT **75-46-7P** 7440-01-9P, Neon, preparation 7440-37-1P, Argon, preparation 7631-86-9P, Silica, preparation **7782-50-5P**, **Chlorine**, preparation
(new ultrahigh-frequency **plasma** discharge for large-scale **etching** processes)
IT 7440-21-3P, Silicon, preparation
(polycryst.; new ultrahigh-frequency **plasma** discharge for large-scale **etching** processes)

L67 ANSWER 4 OF 6 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 124:162357 HCA
TITLE: **Plasma etching** of vias in a dielectric layer with removal of residues
INVENTOR(S): Shan, Hongching; Wu, Robert
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: Eur. Pat. Appl., 7 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
EP 691678	A2	19960110	EP 1995-110240	19950630	<--
EP 691678	A3	19971001			
R: AT, BE, CH, DE, ES, FR, GB, GR, IE, IT, LI, NL, SE					
US 5514247	A	19960507	US 1994-272356	19940708	<--
JP 08172077	A2	19960702	JP 1995-173689	19950710	<--

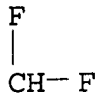
PRIORITY APPLN. INFO.: US 1994-272356 19940708

AB Disclosed is a process for **plasma etching** a mask-patterned dielec. film to form vias on a semiconductor wafer, so that the resulting **tched** structure is devoid of residues on the walls of the structure. A via is an opening through a dielec. material through which a point of contact of underlying metal with a metal film deposited over the dielec. is made. The underlying metal, when exposed to **plasma**, has a tendency

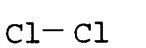
to sputter onto the vertical wall portions of the contact via structures. The metal-contg. sputtered material forms a residue that essentially cannot be removed in the subsequent photoresist stripping process typically used in semiconductor manufg. The **plasma etch** process in accordance with the invention enables removal of the sputtered metal by using with the basic dielec. **etch** gases a gas that reacts with the metal to form volatile compds. which are readily evacuable.

IT **75-46-7, Fluoroform 7782-50-5, Chlorine**, processes
(**plasma etching** of vias in a dielec. layer in presence of)

RN 75-46-7 HCA
CN Methane, trifluoro- (8CI, 9CI) (CA INDEX NAME)



RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-311
ICS H01L021-768
CC 76-2 (Electric Phenomena)
ST **plasma etching** via dielec layer; residue removal via **etching** dielec layer
IT Electric insulators and Dielectrics
(**plasma etching** of vias in a dielec. layer with removal of residues)
IT Sputtering
(**etching**, of vias in a dielec. layer with removal of residues)
IT Electric conductors
(interconnections, **plasma etching** of vias in a dielec. layer with removal of residues)
IT **Etching**
(sputter, of vias in a dielec. layer with removal of residues)
IT **75-46-7, Fluoroform** 75-73-0, Tetrafluoromethane 76-16-4, Hexafluoroethane 7440-37-1, **Argon, processes** 7647-01-0, Hydrogen chloride, processes 7726-95-6, Bromine, processes 7727-37-9, Nitrogen, processes **7782-50-5, Chlorine**, processes 10035-10-6, Hydrogen bromide, processes 10294-34-5, Boron chloride (BCl3)
(**plasma etching** of vias in a dielec. layer in presence of)
IT 7429-90-5, Aluminum, miscellaneous
(**plasma tching** of vias in dielec. layers on)

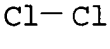
L67 ANSWER 5 OF 6 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 122:21334 HCA
TITLE: Charge damage caused by electron shading effect
AUTHOR(S): Hashimoto, Koichi
CORPORATE SOURCE: LSI Wafer Process Division, Kawasaki, 211, Japan
SOURCE: Japanese Journal of Applied Physics, Part 1: Regular Papers, Short Notes & Review Papers (**1994**), 33(10), 6013-18
CODEN: JAPNDE; ISSN: 0021-4922
DOCUMENT TYPE: Journal
LANGUAGE: English

AB An antenna covered with photoresist patterns having high-aspect-ratio openings caused charge damage to the gate oxide in various processing **plasmas**. This damage increased with the pattern's aspect ratio, and occurred even when the test wafer was cut into chips .apprx.5 mm square and mounted on a wafer with insulation. These results prove the electron shading mod14986-21-1el: the photoresist patterns shade the antenna from electrons of oblique incidence, resulting in local charging occurring without a wafer-scale voltage difference, which is essential for conventional charging. The damaging current from this mechanism increased by a factor of more than ten with a decrease in the gate oxide thickness only from 8 nm to 6 nm, implying that the degree of shading depends on the gate charging voltage. An improved model is proposed top accommodate this strong dependence.

IT **75-46-7, Fluoroform 7782-50-5, Chlorine**, reactions
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)

RN 75-46-7 HCA
CN Methane, trifluoro- (8CI, 9CI) (CA INDEX NAME)

RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 76-3 (Electric Phenomena)
IT Electric capacitors
Ionization in solids
Plasma
Simulation and Modeling, physicochemical
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT Electric breakdown

(of SiO2 gates as function of thickness after **plasma** processing)
IT Sputtering
(**etching**, charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT **Etching**
(sputter, charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT 7631-86-9, Silica, properties
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT 7440-37-1, **Argon**, **processes**
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)
IT **75-46-7**, **Fluoroform** 75-73-0, Tetrafluoromethane
7782-50-5, **Chlorine**, reactions 10035-10-6, Hydrogen bromide, reactions 10294-34-5, Boron trichloride
(charge damage from **plasma** processing of gate oxides due to electron shading by photoresists)

L67 ANSWER 6 OF 6 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 115:237947 HCA
TITLE: **Etching** properties of aluminum oxide films prepared by **plasma** enhanced metal organic chemical vapor deposition
AUTHOR(S): Kang, C. J.; Kim, Y. C.; Park, C. O.; Lee, W. J.; Chun, John S.
CORPORATE SOURCE: Dep. Mater. Sci. Eng., Korea Adv. Inst. Sci. Technol., Seoul, 131-00, S. Korea
SOURCE: Materials Science Monographs (**1991**), 67(High Perform. Ceram. Films Coat.), 391-8
CODEN: MSMODP; ISSN: 0166-6010
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Al2O3 films were deposited on Si substrates at low temps. (150.degree.-300.degree.) by **plasma**-enhanced chem.-vapor deposition using trimethylaluminum, N2O, and **He** **gases**. The films deposited at 150.degree. have an amorphous structure. Those deposited >250.degree. have an extremely fine .gamma.-Al2O3 polycryst. structure. H is the only impurity detected in the Al2O3 film and its concn. increases as the deposition temp. decreases. The dry and wet **etch** behaviors of Al2O3 were studied in F- and Cl-based **plasmas** as well as in a dil. HF soln. The dry and wet **etch** rate of the film decreases as the deposition temp. increases. The Al2O3 films are hardly **etched** in a **CHF3**/C2F6 **plasma**, resulting in the **etch** rate ratio of 1:30 with respect to the low-temp. SiO2. On the other hand, the **etch** rates in a **Cl2**/BCl3/He **plasma** and in a dil. HF soln. are much higher than those in the F-based **plasma**.
CC 57-2 (Ceramics)

ST alumina organometallic **plasma** CVD **etching** property

IT **Etching**
(of alumina films, prepn. by **plasma**-enhanced organometallic CVD in relation to)

IT Coating process
(chem.-vapor, organometallic, **plasma**-enhanced, with alumina, **etching** properties in relation to)

IT 1344-28-1P, Alumina, uses and miscellaneous
(coatings, **etching** properties of, prepn. by **plasma**-enhanced organometallic CVD in relation to)

claim 21

=> d 152 1-2 ibib abs hitstr hitind

L52 ANSWER 1 OF 2 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 134:229141 HCA
TITLE: Inductively coupled **Cl2**/Ar/O2 **plasma etching** of GaN, InGaN, and AlGaN
AUTHOR(S): Lee, Ji-Myon; Chang, Ki-Myung; Park, Seong-Ju; Jang, Hong-Kyu
CORPORATE SOURCE: Department of Materials Science and Engineering and Center for, Kwangju Institute of Science and Technology, Kwangju, 500-712, S. Korea
SOURCE: Journal of the Korean Physical Society (2000), 37(6), 842-845
CODEN: JKPSDV; ISSN: 0374-4884
PUBLISHER: Korean Physical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The **etch** selectivities of GaN and In0.12Ga0.88N over Al0.1Ga0.9N were studied using an inductively coupled **Cl2**/Ar/O2 **plasma** and the results were .ltoreq.24 and 32, resp. An x-ray photoelectron spectroscopic (XPS) anal. of the **etched** surface showed that an Al-O bond was formed on the AlGaN surface during the **Cl2**/Ar/O2 **plasma etching**, so the high selectivity thus obtained could be attributed to the **etch**-resistant oxide layer. This oxide layer could be easily **etched** off by using an **HF**-based soln. during the mask removal process. The at. force microscopic image of the surface morphol. showed an Al/Ga droplet-like structure on the nitride surfaces, that had been **etched** by **O-free plasma** while those that had been **etched** using an O-contg. **plasma** showed a droplet-free smooth surface. A Ga oxynitride layer, which prevented the preferential sputtering of N on the nitride surface, was also obsd. by XPS.

IT **7782-50-5, Chlorine**, processes
(inductively coupled **Cl2**/Ar/O2 **plasma etching** of GaN, InGaN, and AlGaN studied by XPS)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 73-6 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 76
ST inductively coupled **chlorine** argon oxygen **plasma** **etching** semiconductor; gallium nitride **etching** **plasma**; indium gallium nitride **etching** **plasma**; aluminum gallium nitride **etching** XPS
IT **Etching**
(dry and wet; inductively coupled **Cl2**/Ar/O2 **plasma etching** of GaN, InGaN, and AlGaN studied by XPS)
IT Surface structure
X-ray photoelectron spectra
(inductively coupled **Cl2**/Ar/O2 **plasma** **etching** of GaN, InGaN, and AlGaN studied by XPS)
IT **Etching**
(**plasma**; inductively coupled **Cl2**/Ar/O2 **plasma etching** of GaN, InGaN, and AlGaN studied by XPS)
IT 60195-39-3, Gallium oxide nitride
(inductively coupled **Cl2**/Ar/O2 **plasma** **etching** of GaN, InGaN, and AlGaN studied by XPS)
IT 7440-37-1, Argon, processes 7782-44-7, Oxygen, processes **7782-50-5**, **Chlorine**, processes
(inductively coupled **Cl2**/Ar/O2 **plasma** **etching** of GaN, InGaN, and AlGaN studied by XPS)
IT 25617-97-4, Gallium nitride 110759-40-5, Aluminum gallium nitride (Al0.1Ga0.9N) 138133-12-7, Gallium indium nitride (Ga0.88In0.12N) 168269-92-9, Aluminum gallium nitride al0.05ga0.95n
(inductively coupled **Cl2**/Ar/O2 **plasma** **etching** of GaN, InGaN, and AlGaN studied by XPS)
IT 7664-39-3, Hydrogen **fluoride**, processes
(with addnl. wet **etching**; inductively coupled **Cl2**/Ar/O2 **plasma** **etching** of GaN, InGaN, and AlGaN studied by XPS)
REFERENCE COUNT: 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L52 ANSWER 2 OF 2 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 122:44302 HCA
TITLE: Selective **etching** method for amorphous silicon
INVENTOR(S): Shiraishi, Hitoshi; Kaneko, Setsuo
PATENT ASSIGNEE(S): Nippon Electric Co, Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF

DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 06267906	A2	19940922	JP 1993-56697	19930317
JP 07083018	B4	19950906		

PRIORITY APPLN. INFO.: JP 1993-56697 19930317

AB In the title method, a n-type amorphous (or polycryst. or microcryst.) Si film on a non-doped amorphous Si film is **etched** under the following condition: (1) using reactive **O-free** gas mixt. which contains <10% of **F** -contg. gas, and is of **Cl**-contg. **gas** (C- and **F**-free), Br-contg. gas, and/or I-contg. gas (C- and **F**-free), and (2) **etching** at the high pressure **plasma** discharge region in which phys. sputtering effects are restrained and chem. reaction effects mainly appear. By the method, n-type amorphous Si is **etched** selectively and non-doped amorphous Si is hardly **etched**.

IT **7782-50-5**, **Chlorine**, uses
(**etching** of amorphous Si with halogen in TFT manuf.)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

IC ICM H01L021-302
ICA H01L029-784
CC 76-3 (Electric Phenomena)
ST **etching** amorphous silicon TFT; transistor thin film **etching** silicon; halogen **etching** silicon film transistor

IT **Etching**
(**etching** of amorphous Si with halogen in TFT manuf.)

IT Transistors
(field-effect insulated-gate, **etching** of amorphous Si with halogen in TFT manuf.)

IT 7440-21-3, Silicon, processes
(**etching** of amorphous Si with halogen in TFT manuf.)

IT 75-71-8, **Dichlorodifluoromethane** 7726-95-6, Bromine, uses **7782-50-5**, **Chlorine**, uses
(**etching** of amorphous Si with halogen in TFT manuf.)

claim 21

=> d 165 1-17 cbib abs hitstr hitind

L65 ANSWER 1 OF 17 HCA COPYRIGHT 2003 ACS
127:354217 Analysis of a fence-free platinum **etch** process.
Milkove, Keith R.; Wang, Cindy X. (T. J. Watson Research Center,

IBM, Yorktown Heights, NY, 10598, USA). Integrated Ferroelectrics, 17(1-4), 403-419 (English) **1997**. CODEN: IFEREU. ISSN: 1058-4587. Publisher: Gordon & Breach Science Publishers SA.

AB The dry **etch** parameters of Pt electrodes for capacitor structures were varied to measure the influence on the sidewall profile. In 4 expts. it was found that: (i) the inclusion of Ar into the **Cl2**/CF4 gas mixt. promoted the information of fencing, (ii) insufficient total gas flow induced DE cone formation localized to the sidewalls of the **etched** Pt electrodes, (iii) the inclusion of CF4 in the gas mixt. was unnecessary, and (iv) the choice of self-bias voltage influenced the crit. dimension control and sidewall angle of the **etched** Pt electrodes.

IT **7782-50-5**, **Chlorine**, processes
(gas mixt. affecting fence-free dry **etching** of Pt electrodes for capacitor structures)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 76-14 (Electric Phenomena)
Section cross-reference(s): 56

ST platinum electrode dry **etching** gas mixt; argon **chlorine fluoromethane** platinum **plasma etching**

IT Capacitors
(electrode; gas mixt. and bias voltage affecting fence-free dry **etching** of Pt electrodes for capacitor structures)

IT **Etching**
(**plasma**; gas mixt. and bias voltage affecting fence-free dry **etching** of Pt electrodes for capacitor structures)

IT Bias potential
(self-bias voltage affecting fence-free dry **etching** of Pt electrodes for capacitor structures)

IT 75-73-0, **Tetrafluoromethane** 7440-37-1, **Argon**, **processes** **7782-50-5**, **Chlorine**, processes
(**gas** mixt. affecting fence-free dry **etching** of Pt electrodes for capacitor structures)

IT 7440-06-4, Platinum, properties
(gas mixt. and bias voltage affecting fence-free dry **etching** of Pt electrodes for capacitor structures)

L65 ANSWER 2 OF 17 HCA COPYRIGHT 2003 ACS

127:11936 **Etching** effects on ferroelectric capacitors with multilayered electrodes. Chung, Chee Won; Kim, Chang Jung; Lee, June Key; Chung, Ilsub (Materials Devices Research Center, Samsung Advanced Inst. Technology, Suwon, 440, S. Korea). Integrated Ferroelectrics, 13(1-3), 129-140 (English) **1996**. CODEN: IFEREU. ISSN: 1058-4587. Publisher: Gordon & Breach.

AB Dry **etching** of PZT thin film capacitors with RuOx/Pt

multilayered electrodes was studied to examine the **etching** effects. PZT films were deposited on RuOx/Pt/Ti/SiO2/Si substrates by sol-gel process and Pt films were prepd. by d.c. magnetron sputtering. PZT and Pt thin films were **etched** with **Cl2**/C2F6/**Ar gas** combination in an inductively coupled **plasma** by varying the **etching** parameters like coil r.**f**. power, d.c. bias to wafer susceptor, and gas pressure. **Etching** effects were investigated in terms of **etch** rate, **etch** selectivity, **etch** profiles, and elec. properties of **etched** capacitors. Quant. anal. of the **etching** damage was obtained by calcg. the shift of the coercive field and the switchable polarization in hysteresis loops. The **etching** damage mechanism was discussed and the optimization of **etching** processes for the fabrication of PZT capacitors was attempted to minimize the **etching** damage to ferroelec. capacitors.

CC 76-10 (Electric Phenomena)

ST PZT platinum ferroelec capacitor **etching** damage; **plasma etching** kinetics PZT capacitor ferroelectricity

IT Ferroelectric capacitors
Ferroelectricity
(effects of PZT and Pt/RuOx **plasma etching** on ferroelectricity of capacitors with multilayered electrodes)

IT **Etching** kinetics
(of PZT and Pt/RuOx **plasma etching** of ferroelec. capacitors with multilayered electrodes)

IT **Etching**
(**plasma**; effects of PZT and Pt/RuOx **plasma etching** on ferroelectricity of capacitors with multilayered electrodes)

IT 7440-06-4, Platinum, properties 11113-84-1, Ruthenium oxide 111593-93-2, Lead titanium zirconium oxide (PbTi0.46Zr0.54O3)
(effects of PZT and Pt/RuOx **plasma etching** on ferroelectricity of capacitors with multilayered electrodes)

L65 ANSWER 3 OF 17 HCA COPYRIGHT 2003 ACS

127:11363 Current status and requirements for new materials **etching**. Jung, Chan Ouk; Koh, Young Bum; Lee, Moon Yong; Lee, Jong Gil (Semiconductor R&D, Samsung Electronics Co. Ltd., Kyungi-Do, S. Korea). Asia-Pacific Conference on Plasma Science & Technology, 3rd, Tokyo, July 15-17, 1996, Volume 2, 303-308. Editor(s): Kanzawa, Atsushi. Japan Society for the Promotion of Science, Local Organizing Committee of APCPST'96: Tokyo, Japan. (English) **1996**. CODEN: 64HSAN.

AB A review with 9 refs. A quarter micron Pt pattern was **etched** successfully in Ar-contg. halogenated **plasma**. Addn. of Cl to Ar was more effective in reducing the sidewall redeposits than CF4 while **etching** slope was lowered. The **etching** slope was increased up to 70.degree. by adding oxygen to the **Cl** and **Ar gas** mixt.

Although HCl cleaning process is known to work best in removing redeposits thus far, post-**etch** cleaning and controlling of chamber wall contamination appear crucial in Pt **etching**. Lateral **etching** of titanium silicide was reduced by adding nitrogen or oxygen to **chlorine**. Pulse **etching** may help to minimize the lateral **etching** and to increase the process margin. XPS showed that polymer deposition on USG surface was more than on BPSG. In small deep contact or self-aligned contact **etching**, both polymn. and surface reaction with high C/**F** ratio gases will be very important, particularly when USG is involved.

CC 76-0 (Electric Phenomena)
ST review **plasma etching**
IT **Etching**
(**plasma**; current status and requirements for new materials **etching**)

L65 ANSWER 4 OF 17 HCA COPYRIGHT 2003 ACS
126:193614 **Plasma** jet **etching** at atmospheric pressure for semiconductor production. Siniaguine, Oleg (IPEC Precision, Inc., Danbury, CT, USA). International Symposium on Plasma Process-Induced Damage, 1st, Santa Clara, Calif., May 13-14, 1996, 151-153. Editor(s): Cheung, Kin P.; Nakamura, Moritaka; Gabriel, Calvin T. Northern California Chapter of the American Vacuum Society: Sunnyvale, Calif. (English) **1996**. CODEN: 63YRAU.

AB **Plasma** jet **etching** at atm. pressure does not induce Si crystal defects or significant changes in the elec. behavior of Si devices. The **plasma** jet system can be used for isotropic **etching** and photoresist stripping in semiconductor manufg. without yield redn. In applications such as wafer back-side **etching** and thinning, the **plasma** jet system eliminates addnl. operations necessary for wafer front-side protection. Compared to conventional methods, the higher **etch** rate and throughput of the **plasma** jet system reduces manufg. casts.

IT **7782-50-5D**, **Chlorine**, derivs., processes
(**plasma** jet **etching** at atm. pressure for semiconductor prodn.)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 76-3 (Electric Phenomena)
ST **plasma** jet **etching** silicon device
IT **Etching**
(dry; **plasma** jet **etching** at atm. pressure for semiconductor prodn.)
IT Semiconductor devices
(**plasma** jet **etching** at atm. pressure for

semiconductor prodn.)
IT 7440-37-1, **Argon**, **process s** 7782-41-4D, **Fluorine**, derivs., processes **7782-50-5D**, **Chlorine**, derivs., processes
(**plasma jet etching** at atm. pressure for semiconductor prodn.)

L65 ANSWER 5 OF 17 HCA COPYRIGHT 2003 ACS
126:41353 **Etching** of gallium nitride-type compound semiconductor and formation of electrode. Manabe, Katsuhide; Kotaki, Masahiro; Mori, Masaki; Hashimoto, Masafumi (Toyoda Gosei Kk, Japan; Toyoda Chuo Kenkyusho Kk; Shingijutsu Kaihatsu Jigyodan). Jpn. Kokai Tokkyo Koho JP 08274081 A2 **19961018** Heisei, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1996-32658 19960126.
AB Compd. semiconductor contg. Ga and N is subjected to dry-**etching** by **gas plasma** contg. **Cl** and/or Br optionally followed by dry **etching** by **inert gas plasma** on the surface. Alternatively, the semiconductor is dry-**etched** by **inert gas plasma**. The semiconductor is successively subjected to dry **etching** on the surface of a region corresponding to electrode by **inert gas plasma** and to metal vapor deposition to form electrode showing improved ohmic property. The processes are useful for GaN-type semiconductor useful for blue light-emitting diode, etc.
IC ICM H01L021-3065
ICS H01L021-28; H01L021-3205; H01L033-00
CC 76-3 (Electric Phenomena)
ST **etching** gallium nitride semiconductor; **plasma** dry **etching** **chlorine** bromine; **inert** **gas plasma** **etching** semiconductor; electrode formation **etching** gallium nitride; **argon** **gas plasma** dry **etching**; aluminum deposition electrode formation **etching**; blue light emitting diode
IT Electric contacts
Etching
(**plasma** dry **etching** of gallium arsenide-based semiconductor for formation of ohmic electrode)
IT Electroluminescent devices
(**plasma** dry **etching** of gallium arsenide-based semiconductor for formation of ohmic electrode for)
IT 75-71-8, **Dichlorodifluoromethane** 7440-37-1, **Argon**, **processes**
(**etchant**; **plasma** dry **etching** of gallium arsenide-based semiconductor for formation of ohmic electrode)
IT 25617-97-4, Gallium nitride
(**plasma** dry **etching** of gallium arsenide-based semiconductor for formation of ohmic electrode)
IT 7429-90-5, Aluminum, processes

(**plasma** dry **etching** of gallium arsenide-based semiconductor for formation of ohmic electrode including)

L65 ANSWER 6 OF 17 HCA COPYRIGHT 2003 ACS
125:311773 Fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**. Pearton, S. J.; Abernathy, C. R.; MacKenzie, J. D.; Mileham, J. R.; Shul, R. J.; Kilcoyne, S. P.; Hagerott-Crawford, M.; Ren, F.; Hobson, W. S.; Zavada, J. M. (Univ. Florida, Gainesville, FL, 32611, USA). Materials Research Society Symposium Proceedings, 405(Surface/Interface and Stress Effects in Electronic Material Nanostructures), 115-120 (English) **1996**. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.
AB Quantum well microdisk laser structures were fabricated in the GaN/InGaN, GaAs/AlGaAs and GaAs/InGaP systems using a combination of ECR dry **etching** (**Cl2**/CH4/H2/Ar, BCl3/Ar or CH4/Ar **plasma** chemistries, resp.) and subsequent wet chem. **etching** of a buffer layer underlying the quantum wells. While wet **etchants** such as **HF**/H2O and HCl/HNO3/H2O are employed for AlGaAs and InGaP, resp., a new KOH-based soln. was developed for AlN which is completely selective over both GaN and InGaN. Typical mask materials include PR or SiNx, while the high surface recombination velocity of exposed AlGaAs (.apprx.105 cm sec-1) requires encapsulation with ECR-CVD SiNx to stabilize the optical properties of the modulators.
IT **7782-50-5**, **Chlorine**, processes
(fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
ST IIIA VA laser modulator ECR **etching**; modulator optical IIIA VA ECR **etching**; **plasma etching** IIIA VA laser modulator
IT Encapsulation
Lasers
(fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**)
IT Sputtering
(**etching**, ECR; fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**)
IT Optical instruments
(modulators, fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**)
IT Lithography
(photo-, fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**)

IT **Etching**
(sputter, ECR; fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**)
IT 1303-00-0, Gallium arsenide, uses 12033-89-5, Silicon nitride si3n4, uses 24304-00-5, Aluminum nitride (AlN) 25617-97-4, Gallium nitride (GaN) 37382-15-3, Aluminum gallium arsenide ((Al,Ga)As) 106312-00-9, Gallium indium phosphide 120994-23-2, Gallium indium nitride (GaInN)
(fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**)
IT 74-82-8, Methane, processes 1333-74-0, Hydrogen, processes 7440-37-1, **Argon**, **processes 7782-50-5**, **Chlorine**, processes 9080-17-5, Ammonium sulfide ((NH4)2(Sx)) 10294-34-5, Boron chloride (BCl3)
(fabrication of novel III-N and III-V modulator structures by ECR **plasma etching**)

L65 ANSWER 7 OF 17 HCA COPYRIGHT 2003 ACS
124:304031 Dry **etching** of Pt/PbZrxTi1-xO3/Pt thin film capacitors in an inductively coupled **plasma** (ICP). Chung, Chee Won; Lee, Wan In; Lee, June Key (Mater. Devices Res. Cent., Samsung Adv. Inst. Technol., Suwon, S. Korea). Integrated Ferroelectrics, 11(1-4), 259-67 (English) **1995**. CODEN: IFEREU. ISSN: 1058-4587. Publisher: Gordon & Breach.
AB Dry **etching** of PZT and Pt thin films was studied with **Cl2**/C2F6/**Ar gas** in an inductively coupled **plasma**. The **etch** rates were investigated for various **etching** conditions (gas compn. and pressure, RF powder, d.c. bias). An **etch** rate of 430-1500 .ANG./min was obtained for PZT films and 120-1890 .ANG./min for Pt films. PZT/Pt **etching** selectivity was controllable in the range 0.32-6.12. Profiles clearly showed a high degree of anisotropic **etching**. For fabrication of Pt/PZT/Pt thin-film capacitors, an **etching** process of conventional photolithog. was developed, with high rates and good selectivities.
IT **7782-50-5**, **Chlorine**, processes
(dry **etching** of Pt/PZT/Pt thin film capacitors in an inductively coupled **plasma** of Cl/C2F6/Ar)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 76-11 (Electric Phenomena)
ST PZT platinum thin film capacitor **etching**; **plasma** dry **etching** lead zirconate titanate
IT Electric capacitors
(dry **tching** of Pt/PZT/Pt thin film capacitors in an inductively coupled **plasma** of Cl/C2F6/Ar)
IT Sputtering
(**etching**, dry **etching** of Pt/PZT/Pt thin film

capacitors in an inductively coupled **plasma** of Cl/C2F6/Ar)

IT **Etching**
(sputter, dry **etching** of Pt/PZT/Pt thin film capacitors in an inductively coupled **plasma** of Cl/C2F6/Ar)

IT 76-16-4, **Hexafluoroethane** 7440-37-1, **Argon**, **processes** 7782-50-5, **Chlorine**, processes
(dry **etching** of Pt/PZT/Pt thin film capacitors in an inductively coupled **plasma** of Cl/C2F6/Ar)

IT 7440-06-4, Platinum, processes 12626-81-2, PZT
(dry **etching** of Pt/PZT/Pt thin film capacitors in inductively coupled **plasma** of **Cl2**/C2F6/Ar)

L65 ANSWER 8 OF 17 HCA COPYRIGHT 2003 ACS

123:327763 Anisotropic polysilicon **plasma etch** using **fluorine**-containing gases. Cher, Ming Shry; Shan, Chung Hsing (Taiwan Semiconductor Manufacturing Co., Ltd., Taiwan). U.S. US 5453156 A **19950926**, 8 pp. (English). CODEN: USXXAM. APPLICATION: US 1994-332907 19941101.

AB A process for dry **etching** a polysilicon layer or gate structure of an integrated circuit is achieved. More particularly, a process for overetching a polysilicon layer using, in place of a conventional **Cl**-contg. **gas** (e.g., CCl4), a **F**-contg. gas, e.g. C2F6 or CF4, is disclosed. After the main **etch** step, a passivation formation step is performed, in which a mixt. of **He** and **F gases** is flowed into a **plasma etch** chamber. Next, an overetch is performed by flowing a mixt. of **He** and **Cl gas**. This process eliminates the need to use CCl4 or other harmful O3-contg. gases in the overetch step. Also, an acceptable polysilicon sidewall profile is achieved and no undercutting of the polysilicon layer is experienced using this process.

IC ICM H01L021-00

NCL 156643100

CC 76-3 (Electric Phenomena)

ST anisotropic polysilicon **plasma etching**; **fluorine** contg gas polysilicon **plasma etching**

IT Sputtering
(**etching**, anisotropic polysilicon **plasma etch** using **fluorine**-contg. gases)

IT Electric circuits
(integrated, anisotropic polysilicon **plasma etch** using **fluorine**-contg. gases in manuf. of)

IT **Etching**
(sputter, anisotropic polysilicon **plasma etch** using **fluorine**-contg. gases)

IT 75-73-0, **Tetrafluoromethane** 76-16-4, **Perfluoroethane**
(anisotropic polysilicon **plasma etch** using)

IT 7440-21-3, Silicon, processes

(polycryst.; anisotropic polysilicon **plasma** **etch** using **fluorine**-contg. gases)

L65 ANSWER 9 OF 17 HCA COPYRIGHT 2003 ACS
123:45927 Manufacture of semiconductor device involving dry **etching** of metal thin film. Tokashiki, Takeshi (Nippon Electric Co, Japan). Jpn. Kokai Tokkyo Koho JP 07094492 A2 **19950407** Heisei, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1994-55064 19940301. PRIORITY: JP 1993-175930 19930624.

AB The manuf. involves dry **etching** of a noble metal thin film formed on a substrate to obtain a pattern by the following steps: (1) forming an **etching** mask pattern on the metal thin film, (2) dry **etching** the film in the presence of a halo-contg. **gas** contg. **F**, **Cl**, Br, and/or I, a .beta.-diketone which can form a metal complex with the noble metal, and a halo compd.-reducing gas. The noble metal may be Cu. Highly anisotropic **etching** with little side **etching** was carried out by the processes.

IT **7782-50-5**, **Chlorine**, processes
(**etching** gas; manuf. of semiconductor device involving **plasma** **etching** of wiring from noble metal thin film)

RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

IC ICM H01L021-3065
ICS H01L021-3205
CC 76-3 (Electric Phenomena)
ST semiconductor device **etching** dry metal; diketone beta etcing **gas** **noble** metal; anisotropic **etching** **plasma** semiconductor device; copper film **etching** dry diketone
IT Electric conductors
Semiconductor devices
(manuf. of semiconductor device involving **plasma** **etching** of wiring from noble metal thin film)
IT Group IB elements
(manuf. of semiconductor device involving **plasma** **etching** of wiring from noble metal thin film)
IT Sputtering
(**etching**, manuf. of semiconductor device involving **plasma** **etching** of wiring from noble metal thin film)
IT **Etching**
(sputter, manuf. of semiconductor device involving **plasma** **etching** of wiring from noble metal thin film)
IT 1522-22-1
(**etching** gas; manuf. of semiconductor device involving

plasma etching of wiring from noble metal thin film)

IT 7553-56-2, Iodine, processes 7664-41-7, Ammonia, processes 7726-95-6, Bromine, processes 7782-41-4, **Fluorine**, processes **7782-50-5, Chlorine**, processes
(**etching** gas; manuf. of semiconductor device involving **plasma etching** of wiring from noble metal thin film)

IT 12033-89-5, Silicon nitride, processes 25583-20-4, Titanium nitride
(**etching** mask; manuf. of semiconductor device involving **plasma etching** of wiring from noble metal thin film)

IT 7440-06-4, Platinum, processes 7440-50-8, Copper, processes
(manuf. of semiconductor device involving **plasma etching** of wiring from noble metal thin film)

L65 ANSWER 10 OF 17 HCA COPYRIGHT 2003 ACS

121:269803 Use of a faceted **etch** process to eliminate stringers. Doan, Trung T.; Blalock, Guy T. (Micron Semiconductor, Inc., USA). U.S. US 5346585 A **19940913**, 7 pp. (English). CODEN: USXXAM. APPLICATION: US 1993-49274 19930420.

AB A process to create a faceted profile for an integrated circuit, in which the top corners of a layer disposed over a feature are preferentially **etched**, thereby creating slopes. The profile which results from the deposition of subsequent layers is more easily **etched** as a result of the contour imparted by the faceted edges. Since the subsequent layers are placed in the line of sight of the **etch plasma**, there are significantly fewer stringers.

IT **7782-50-5, Chlorine**, processes
(in faceted reactive ion **etching** of layer corners in integrated-circuit manuf.)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

IC ICM H01L021-00

NCL 156643000

CC 76-3 (Electric Phenomena)

ST faceted **etch** integrated circuit stringer elimination

IT Metals, processes
(faceted reactive ion **etching** of layer corners in integrated-circuit manuf.)

IT Sputtering
(**etching**, reactive, faceted; to eliminate stringers in integrated-circuit manuf.)

IT Electric circuits
(integrated, faceted **etch** process to eliminate stringers in manuf. of)

IT **Etching**
(sputter, reactive, faceted; to eliminate stringers in integrated-circuit manuf.)
IT 7440-37-1, **Argon**, **processes** 7440-59-7, **Helium**, **processes** 7440-63-3, Xenon, processes 7726-95-6, Bromine, processes 7782-41-4, **Fluorine**, processes **7782-50-5**, **Chlorine**, processes
(in faceted reactive ion **etching** of layer corners in integrated-circuit manuf.)
IT 7440-21-3, Silicon, processes
(polycryst.; faceted reactive ion **etching** of layer corners in integrated-circuit manuf.)

L65 ANSWER 11 OF 17 HCA COPYRIGHT 2003 ACS
120:180049 Comparing reactive ion **etching** of III-V compounds in **Cl2**/BCl3/Ar and CCl2F2/BCl3/Ar discharges. Juang, Y. Z.; Su, Y. K.; Shei, S. C.; Fang, B. C. (Dep. Electr. Eng., Natl. Cheng Kung Univ., Tainan, Taiwan). Journal of Vacuum Science & Technology, A: Vacuum, Surfaces, and Films, 12(1), 75-82 (English) **1994**. CODEN: JVTAD6. ISSN: 0734-2101.
AB The reactive ion **etching** (RIE) of GaAs, AlGaAs, InP, InGaAs, InGaAsP in **Cl2**/BCl3/Ar or CCl2F2/BCl3/Ar discharges was studied as a function of the **plasma** parameters: power, pressure, and relative compn. as well as **etching** time. Due to the formation of In-based **fluoride** with high b.p., the **etching** rates of all of these materials are faster in **Cl2**/BCl3/Ar in comparison to CCl2F2/BCl3/Ar. The In-based compds. show a similar dependence on power d. and discharge compn., but it is quite different from GaAs. When discharges contg. CCl2F2 are used, the surface morphologies are quite rough after the treatment of RIE with either type of discharge, although smooth **etching** surfaces can be obtained under appropriate conditions. Using BCl3 contg. gas discharges will enhance smooth surface and maintain high **etching** rate. For selective **etching** of GaAs on AlGaAs, gas mixts. contg. CCl2F2 are used. High performance and high selective **etching** can be obtained by using CCl2F2/BCl3/**Ar gases** mixts. Photoresists or SiO2 were used as **etching** masks. SiO2 is better than the photoresist mask for its low **etching** rate and sputtering to III-V compds., and it could be in situ removed by CF4 **plasma**. The photoluminescence measurements show high performance of **etched** results when the power d. was maintained at < 0.6 W/cm2.
IT **7782-50-5**, **Chlorine**, reactions
(sputter **etching** of Group IIIA pnictides by discharge mixt. contg.)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl— Cl

CC 76-11 (Electric Phenomena)
ST reactive ion **etching** Group IIIA pnictide
IT Group IIIA element pnictides
(sputter **etching** of, using **chlorine**-boron chloride-argon or **dichlorodifluoromethane**-boron chloride-argon mixts.)
IT Sputtering
(**etching**, of Group IIIA pnictides using **chlorine**-boron chloride-argon or **dichlorodifluoromethane**-boron chloride-argon mixts.)
IT Resists
(photo-, sputter **etching** of, using **chlorine** -boron chloride-argon or **dichlorodifluoromethane**-boron chloride-argon mixts.)
IT Surface structure
(roughness, after sputter **etching** of Group IIIA pnictides)
IT **Etching**
Kinetics of **etching**
(sputter, of Group IIIA pnictides using **chlorine**-boron chloride-argon or **dichlorodifluoromethane**-boron chloride-argon mixts.)
IT 7783-52-0P, Indium **trifluoride**
(formation of, in **plasma etching** of indium pnictides, slowing of **etching** by)
IT 7631-86-9, Silica, uses
(masks, **etching** of, with carbon **tetrafluoride** **plasma** on Group IIIA pnictides)
IT 60267-30-3, AZ1350J
(masks, **etching** of, with **chlorine**-boron chloride-argon or **dichlorodifluoromethane**-boron chloride-argon mixts.)
IT 75-73-0, Carbon **tetrafluoride**
(**plasma etching** of silicon dioxide masks with)
IT 75-71-8, **Dichlorodifluoromethane** 10294-34-5, Boron chloride (BCl3)
(sputter **etching** of Group IIIA pnictides by discharge mixt. contg.)
IT 7440-37-1, Argon, reactions **7782-50-5, Chlorine**, reactions
(sputter **etching** of Group IIIA pnictides by discharge mixt. contg.)
IT 1303-00-0, Gallium arsenide, reactions 12645-36-2, Gallium indium arsenide phosphide 22398-80-7, Indium phosphide, reactions 106097-59-0, Gallium indium arsenide Ga0.47In0.53as 106218-96-6, Aluminum gallium arsenide (Al0.4Ga0.6As) 106312-09-8, Aluminum gallium arsenide (Al0.2Ga0.8As) 106495-76-5, Aluminum gallium arsenide (Al0.25Ga0.75As)
(sputter **etching** of, using **chlorine**-boron chloride-argon or **dichlorodifluoromethane**-boron

chloride-argon mixts.)

L65 ANSWER 12 OF 17 HCA COPYRIGHT 2003 ACS
118:245396 Via hole process for gallium arsenide monolithic microwave integrated circuit using two-step dry **etching**. Chung, M. S.; Kim, H. R.; Lee, J. E.; Kang, B. K.; Kim, B. M. (Pohang Inst. Sci. Technol., Pohang, S. Korea). Journal of Vacuum Science & Technology, B: Microelectronics and Nanometer Structures, 11(2), 159-64 (English) **1993**. CODEN: JVTBD9. ISSN: 0734-211X.
AB A fast, reproducible, and reliable via hole dry **etching** process for GaAs monolithic microwave integrated circuit (MMIC) fabrication is described. The **etching** process consists of 2 steps. During the 1st **etching** step, a BCl3/**Cl2** /**Ar gas** mixt. is used to achieve a high **etch** rate and small lateral **etching**. In the 2nd **etching** step, CCl2F2 gas is used to achieve a selective **etching** of the GaAs substrate with respect to the front side metal layer, which is 500-.ANG.-thick Cr. Via holes are formed from the back side of a 100-.mu.m-thick GaAs substrate and are electroplated with Au (.apprx.20-.mu.m-thick). The resulting via hole profile and surface morphol. are satisfactory for reproducible and reliable MMIC via groundings. CCl2F2.
IT **7782-50-5**, **Chlorine**, uses
(dry **etching** with, in via hole process for gallium arsenide monolithic microwave integrated circuits)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 76-2 (Electric Phenomena)
ST via hole gallium arsenide **plasma etching**; boron chloride **plasma etching** via hole; **chlorine plasma etching** via hole; **dichlorodifluoromethane plasma etching** via hole; argon **plasma etching** via hole
IT Sputtering
(**etching**, in via hole process for gallium arsenide monolithic microwave integrated circuits)
IT Electric circuits
(integrated, gallium arsenide monolithic microwave, via hole process for, using two-step dry **etching**)
IT **Etching**
(sputter, in via hole process for gallium arsenide monolithic microwave integrated circuits)
IT 75-71-8, Carbon chloride **fluoride** (CCl2F2) 7440-37-1, Argon, uses **7782-50-5**, **Chlorine**, uses 10294-34-5, Boron trichloride
(dry **etching** with, in via hole process for gallium arsenide monolithic microwave integrated circuits)
IT 1303-00-0, Gallium monoarsenide, uses

(monolithic microwave integrated circuits, via hole process for, using two-step dry **etching**)

L65 ANSWER 13 OF 17 HCA COPYRIGHT 2003 ACS
114:92357 **Plasma etching** of wall deposition.
Iwasaki, Akinori; Higuchi, Hisashi; Okubo, Daigoro; Oyama, Takeshi (Kyocera Corp., Japan). Jpn. Kokai Tokkyo Koho JP 02197572 A2 **19900806** Heisei, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1989-18219 19890127.
AB The title method uses ClF3 mixed with an **inert gas** at 9:1 to 3:7 for removal of wall deposition with glow discharge after **plasma** chem. vapor deposition of amorphous Si carbide.
IC ICM C23C016-44
ICS C23C016-56; C23F004-00
CC 75-2 (Crystallography and Liquid Crystals)
ST **plasma etching** removal wall deposition; amorphous silicon carbide wall deposition removal; **chlorine fluoride inert gas plasma etching**
IT Sputtering
(**etching**, removal of wall deposition of amorphous silicon carbide by, with **chlorine fluoride-inert gas** mixt.)
IT **Etching**
(sputter, removal of wall deposition of amorphous silicon carbide by, with **chlorine fluoride-inert gas** mixt.)
IT 7790-91-2, **Chlorine trifluoride** (ClF3)
(mixed with **inert gas, plasma etching** of silicon carbide wall deposition by)
IT 409-21-2, Silicon carbide, reactions
(**plasma etching** of amorphous wall deposition of, for removal)

L65 ANSWER 14 OF 17 HCA COPYRIGHT 2003 ACS
99:62630 Reactive ion **etching** of silicon with **chlorine** /argon. (1). Pogge, H. B.; Bondur, J. A.; Burkhardt, P. J. (Gen. Technol. Div., IBM Corp., Hopewell Junction, NY, 12533, USA). Journal of the Electrochemical Society, 130(7), 1592-7 (English) **1983**. CODEN: JESOAN. ISSN: 0013-4651.
AB A study of the use of reactive Cl species for **etching** Si and SiO2 in a **plasma etching** process was made with a **Cl2-Ar gas** mixt. in a cathode-coupled diode system. A key advantage of the **Cl2-Ar gas** mixt. is the ability to achieve high **etch** rate ratios between Si and SiO2 (.gtoreq.20:1) coupled with no mask undercutting, which tends to be prevalent with **fluorinated** gas systems. **Etching** characteristics of Si as a function of process parameters (**Cl2** concn., pressure, system loading) and material parameters (e.g., Si cond., edge shape of SiO2 mask) were evaluated. These parameters can

influence the Si **etch** rate, the Si/SiO2 **etch** rate ratio, as well as the **etched** edge shape.

IT **7782-50-5**, reactions
(reactive-ion **etching** of silicon by argon and)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 76-11 (Electric Phenomena)

ST **plasma etching** silicon; reactive ion **etching** silicon; **chlorine plasma etching** silicon; argon **plasma etching** silicon

IT **Plasma**, chemical and physical effects
(**etching** by, of silicon, with **chlorine** and argon)

IT **Etching**
(sputter, of silicon by **chlorine** and argon)

IT **7782-50-5**, reactions
(reactive-ion **etching** of silicon by argon and)

IT 7440-37-1, reactions
(reactive-ion **etching** of silicon by **chlorine** and)

IT 7440-21-3, reactions 7631-86-9, reactions
(reactive-ion **etching** of, by **chlorine** and argon)

L65 ANSWER 15 OF 17 HCA COPYRIGHT 2003 ACS

96:96238 Reactive-ion **etching** of polycrystalline silicon. (International Business Machines Corp., USA). Jpn. Kokai Tokkyo Koho JP 56144542 A2 **19811110** Showa, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1981-31449 19810306. PRIORITY: US 1980-130892 19800317.

AB A reactive-ion **etching** process is described for selective **etching** of polycryst. Si over single-cryst. Si. The process utilizes **plasma** (10-500 mtorr) from CF4 x, **Cl2** y, and an **inert gas** z parts, where x + y + z = 100; x + y .ltoreq. 25; and x, y > 0. The process is useful in fabrication of a semiconductor device (e.g., a FET integrated circuit).

IT **7782-50-5**, reactions
(**etching** of polycryst. silicon by **plasma** from carbon **tetrafluoride** and)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

IC H01L021-302

CC 76-3 (Electric Phenomena)
ST reactive ion **etching** polycryst silicon; **chlorine plasma etching** polycryst silicon; carbon **fluoride etching** polycryst silicon
IT **Plasma**, chemical and physical effects
(**etching** by, of polycryst. silicon)
IT Semiconductor devices
(selective **etching** of polycryst. silicon in fabrication of)
IT **Etching**
(dry, of polycryst. silicon)
IT Transistors
(field-effect, selective **etching** of polycryst. silicon in fabrication of)
IT **7782-50-5**, reactions
(**etching** of polycryst. silicon by **plasma** from carbon **tetrafluoride** and)
IT 75-73-0
(**etching** of polycryst. silicon by **plasma** from **chlorine** and)
IT 7440-21-3, reactions
(polycryst., **etching** of, by **plasma** from **chlorine** and carbon **tetrafluoride**)

L65 ANSWER 16 OF 17 HCA COPYRIGHT 2003 ACS
96:27485 Fabrication of microminiature devices using **plasma etching** of silicon and resultant products. Maydan, Dan; Flamm, Daniel Lawrence; Wang, David Nin Kou (Western Electric Co., Inc. , USA). PCT Int. Appl. WO 8102947 A1 **19811015**, 23 pp. DESIGNATED STATES: W: JP; RW: DE, FR, GB, NL. (English). CODEN: PIXXD2. APPLICATION: WO 1981-US349 19810320. PRIORITY: US 1980-138083 19800407.
AB A process for fabricating microminiature devices such as integrated circuits utiliaing delineating fine-line patterns by dry **etching** is described. The process involves the cry **etching** of of at least of one surface of Si using a **F**-contg. gaseous **etchant** and the reaction product does not **etch** the other surface of the device. The **F**-contg. gases are selected from ClF3, NF3 BrF3 or IF3; together with **inert gases**, **Cl**, CCl4 or **F**. The **etching** processes are substantially free of any proximity effects and are characterized by a high **etching** rate at relatively low power levels, high selectivity, and excellent uniformity. The amt. of undercutting achieved during the **etching** process can be selectively controlled.
IT **7782-50-5**, reactions
(**etching** of silicon by **fluorine**-contg. gases in, in integrated circuit fabrication)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

IC H01L021-306; H01L021-312
CC 76-3 (Electric Phenomena)
ST integrated circuit **plasma etching**; silicon circuit **plasma etching**; **fluorine plasma etching** integrated circuit
IT **Plasma**, chemical and physical effects
(**etching**, in integrated-circuit fabrication)
IT **Etching**
(dry, in integrated-circuit fabrication)
IT Electric circuits
(integrated, **plasma etching** in fabrication of)
IT 56-23-5, reactions 7782-41-4, reactions **7782-50-5**, reactions
(**etching** of silicon by **fluorine**-contg. gases in, in integrated circuit fabrication)
IT 7783-54-2 7787-71-5 7790-91-2 22520-96-3
(**etching** of silicon by, in integrated circuit fabrication)
IT 7440-21-3, properties
(**plasma etching** of, in integrated-circuit fabrication)

L65 ANSWER 17 OF 17 HCA COPYRIGHT 2003 ACS
94:218504 Contamination-free selective reactive ion **etching** or polycrystalline silicon against silicon dioxide. Forget, Lawrence E.; Gdula, Robert A.; Hollis, Joseph C. (International Business Machines Corp. , USA). U.S. US 4264409 **19810428**, 6 pp. (English). CODEN: USXXAM. APPLICATION: US 1980-130916 19800317.
AB Selective directional and contamination-free reactive ion **etching** of Si against insulator mask is achieved by subjecting the unmasked region of the body of a radio-frequency **plasma** consisting of x parts SiF4, y parts **Cl2**, and z parts **inert gas**, wherein x + y + z = 100, x + y .ltorsim. 25, x >0, and y > 0, until the desired **etching** is completed. The Si body may be mono- or polycryst., and the mask, SiO2. The **inert gas** may be **He** or Ar, and x = 1.5-20 parts, x + y = 2-25 parts. The process has selectivity (high Si/SiO2 **etch** rate ratio) and directionality which creates vertical sidewalls on the **etched** features, and the gas contains no contaminants which can cause yield problems in very large-scale integrated circuits. No brown Si redeposits on the inside surface of the reactor.
IT **7782-50-5**, reactions
(**etching** by **plasma** of silicon **tetrafluoride** and, of silicon for integrated circuits)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl— Cl

IC H01L021-306
NCL 156643000
CC 76-4 (Electric Phenomena)
ST ion **etching** silicon integrated circuit; **plasma** **etching** silicon integrated circuit; **chlorine** **etching** silicon integrated circuit; **fluoride** silicon **etching** integrated circuit
IT **Plasma**, chemical and physical effects
(**etching** by **chlorine**-silicon **tetrafluoride**, of silicon for integrated circuits)
IT **Etching**
(sputter, of silicon for integrated circuits, by **chlorine** -silicon **tetrafluoride** mixt.)
IT 7783-61-1
(**etching** by **plasma** from **chlorine** and, of silicon for integrated circuits)
IT **7782-50-5**, reactions
(**etching** by **plasma** of silicon **tetrafluoride** and, of silicon for integrated circuits)
IT 7631-86-9, uses and miscellaneous
(**etching** masks, in **plasma etching** of silicon for integrated circuits)
IT 7440-21-3, reactions
(**etching** of, by **plasma** from **chlorine** and silicon **tetrafluoride**, for integrated circuit)